

Panasonic® Electret Condenser Microphone Cartridges

Consists of a high voltage internal electret membrane, metal electrode and a Field Effect Transistor (FET). Doesn't need a high-voltage bias from the outside like ordinary condenser microphones. **Features:** Highly efficient electrical specification, pressure type operating principle, low impedance (2.2kΩ), omnidirectional back directivity and a high degree of reliability under adverse shock, vibration and environmental tests. **Applications:** Telephone and telephone answering devices, tape recorders, intercoms, computer modems, completed microphones for recording, testing and monitoring, hearing aids, sonic controlled toys and sensors and others. All buzzers and microphones are non-washable.

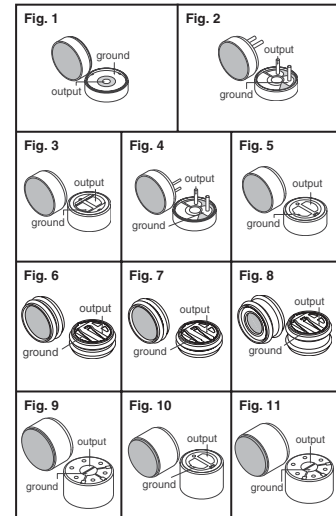
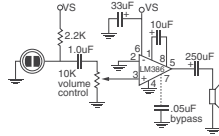
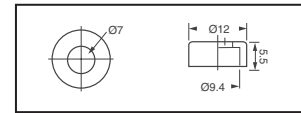


Fig.	Physical Size (mm)	Sensitivity (0dB = 1V/Pa)	Frequency Range (Hz)	Operating Voltage Max./Std.	Current Consumption Max.	Sensitivity Reduction	S/N Ratio	Digi-Key Part No.	Price Each	100	Panasonic Part No.	
Omnidirectional												
1	06.0 x 1.3	-44dB ±3dB	20 - 16k	10V/2V	0.5mA	within -3dB @ 1.5V >58dB		P11958-ND†	3.02	2.68	2.17	WM-63GNT
2	06.0 x 1.3	-44dB ±3dB	20 - 16k	10V/2V	0.5mA	within -3dB @ 1.5V >58dB		P11961-ND†	3.47	3.08	2.49	WM-63PRT
3	06.0 x 2.2	-45dB ±4dB	20 - 16k	10V/2V	0.5mA	within -3dB @ 1.5V >58dB		P9955-ND†	2.05	1.82	1.48	WM-64C
3	06.0 x 2.2	-45dB ±4dB	20 - 16k	10V/2V	0.5mA	within -3dB @ 1.5V >58dB		P9958-ND†	2.03	1.81	1.46	WM-64K
1	06.0 x 2.2	-44dB ±3dB	20 - 16k	10V/2V	0.5mA	within -3dB @ 1.5V >58dB		P11994-ND†	1.99	1.77	1.43	WM-64MCT
1	06.0 x 2.2	-44dB ±3dB	20 - 16k	10V/2V	0.5mA	within -3dB @ 1.5V >58dB		P11965-ND†	2.11	1.88	1.52	WM-64MNT
4	06.0 x 2.2	-44dB ±3dB	20 - 16k	10V/2V	0.5mA	within -3dB @ 1.5V >58dB		P11969-ND†	2.52	2.23	1.81	WM-64PNT
5	06.0 x 3.4	-35dB ±4dB	20 - 20k	10V/2V	0.5mA	within -3dB @ 1.5V >62dB		P9925-ND†	1.86	1.66	1.34	WM-61A
6	07.7 x 3.0	-44dB ±3dB	20 - 16k	10V/2V	0.5mA	within -3dB @ 1.5V >58dB		P11959-ND	4.97	4.41	3.56	WM-63GNT330
7	07.5 x 2.4	-44dB ±3dB	20 - 16k	10V/2V	0.5mA	within -3dB @ 1.5V >58dB		P11960-ND	5.01	4.44	3.59	WM-63GNT335
8	07.7 x 4.0	-44dB ±3dB	20 - 16k	10V/2V	0.5mA	within -3dB @ 1.5V >58dB		P11966-ND	3.90	3.47	2.80	WM-64MNT330A
Uni-Directional — RoHS Compliant												
9	09.7 x 5.0	-47dB ±4dB	100 - 16k	10V/1.5V	0.5mA	within -3dB @ 1V >60dB		P9961-ND	2.52	2.23	1.81	WM-55A103
10	06.0 x 5.0	-50dB ±4dB	100 - 12k	10V/2V	0.5mA	within -3dB @ 1.5V >55dB		P9964-ND	2.11	1.88	1.52	WM-65A103
Noise Canceling — RoHS Compliant												
11	09.7 x 5.0	-54dB ±4dB	100 - 10k	10V/1.5V	0.5mA	within -3dB @ 1V >58dB		P9897-ND	2.77	2.46	1.99	WM-55D103

◆ RoHS Compliant † With built-in cap

Microphone Holder

Digi-Key Part No.	1	10	Price Each	100	500	Panasonic Part No.	Use With Panasonic Part No.
P9952-ND	.59	.50	.39	.28		M3CA0207A4	WM-55A103, WM-55D103

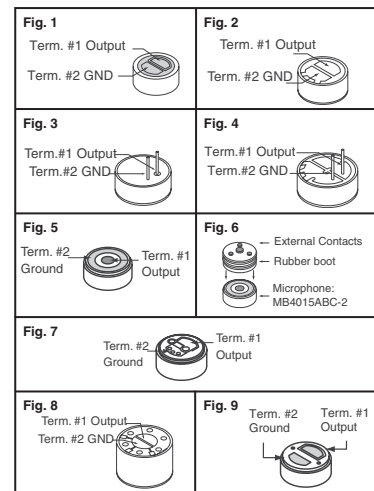


KNOWLES ACOUSTICS Electret Condenser Microphones

Applications: • Headsets • Corded and cordless telephones • PCs, PC tablets, laptops • PDAs, MP3 players • Automotive and automotive accessories • General electronics **Features:** • Operating Temperature: -25°C - 55°C • Highly efficient electrical specifications • Provide good acoustic performance and reliability under typical environmental conditions • Industry standard sizes • Omni, Uni, and Noise Canceling • Integrated RF filtering • Multiple terminations available - Solderless, Pin Type, and PCB

Fig.	Physical Size (mm)	Sensitivity @1kHz (dB re 1V/Pa)	Freq. Range (Hz)	Stan. Operat. Volt.	Max. Operat. Volt.	Max. Current Consumption (mA)	S/N Ratio	Built-in Capacitor	Digi-Key Part No.	Price Each	10	100	Knowles Acoustics Part No.
Omnidirectional													
1	03.0 x 1.5	-44 ±3	100 - 10K	2.0	10	0.500	>55dB	10pF, 33pF	423-1087-ND	4.45	3.11	2.55	MB3015ASC-2
1	06.0 x 1.3	-42 ±3	100 - 10K	2.0	10	0.500	>60dB	10pF, 33pF	423-1089-ND	2.28	1.54	1.19	MB6013ASC-1
1	06.0 x 1.5	-42 ±3	100 - 10K	2.0	10	0.500	>60dB	10pF, 33pF	423-1090-ND	2.28	1.54	1.19	MB6015ASC-1
1	06.0 x 2.2	-42 ±3	100 - 10K	2.0	10	0.500	>60dB	10pF, 33pF	423-1091-ND	2.07	1.35	1.06	MB6022ASC-1L
1	06.0 x 2.7	-42 ±3	100 - 10K	2.0	10	0.500	>60dB	10pF, 33pF	423-1093-ND	2.01	1.33	1.03	MB6027ASC-1L
1	06.0 x 2.7	-42 ±3	100 - 10K	2.0	10	0.500	>60dB	10pF, 33pF	423-1045-ND	1.92	1.30	1.01	MB6027ASC-1
1	06.0 x 5.2	-42 ±3	100 - 10K	2.0	10	0.500	>60dB	10pF, 33pF	423-1095-ND	2.47	1.68	1.30	MB6052ASC-1
2	06.0 x 3.0	-38 ±4	100 - 10K	3.0	10	0.500	>55dB	None	423-1018-ND	1.77	1.60	1.30	MD6030ASZ-1
3	09.7 x 4.5	-41 ±3	100 - 10K	2.0	10	0.500	>55dB	10pF	423-1024-ND	1.25	.80	.58	MD9745APA-1
3	06.0 x 2.2	-40 ±3	100 - 10K	2.0	10	0.500	>60dB	10pF, 33pF	423-1043-ND	1.86	1.68	1.34	MB6022APC-0
4	09.7 x 4.5	-44 ±2	100 - 10K	2.0	10	0.500	>55dB	None	423-1023-ND	1.01	.91	.75	MD9745APF
5	04.0 x 1.5	-44 ±2	100 - 10K	2.0	10	0.500	>55dB	10pF, 33pF	423-1049-ND	3.43	2.95	2.68	MB4015ABC-2
6	04.0 x 1.5	-44 ±2	100 - 10K	2.0	10	0.500	>55dB	10pF, 33pF	423-1050-ND	4.13	3.50	3.18	MB4015ARC-0 (Poly)
7	04.0 x 1.5	-42 ±3	100 - 10K	2.0	10	0.500	>55dB	10pF, 33pF	423-1047-ND	3.64	3.28	3.21	MB4015ASC-1
7	06.0 x 2.2	-45 ±2	100 - 10K	3.0	10	0.500	>60dB	10pF, 33pF	423-1075-ND	1.62	1.46	1.17	MB6022ABC-3
Noise Canceling													
1	06.0 x 2.2	-44 ±3	100 - 10K	2.0	10	0.500	>60dB	10pF, 33pF	423-1092-ND	2.73	1.85	1.50	MB6022NSC-2
7	04.0 x 1.5	-46 ±3	100 - 10K	2.0	10	0.500	>55dB	10pF, 33pF	423-1053-ND	4.16	3.75	3.67	MB4015NSC-3
8	09.7 x 5.2	-38 ±3	300 - 6K	3.0	10	0.500	>55dB	None	423-1027-ND	2.37	2.14	1.72	MD9752NSZ-0
8	09.7 x 5.5	-40 ±3	300 - 6K	3.0	10	0.500	>55dB	None	423-1079-ND	1.85	1.67	1.34	MD9752NSZ-1
Unidirectional													
1	03.0 x 1.5	-51 ±4	100 - 10K	2.0	10	0.500	>45dB	33pF	423-1088-ND	4.92	3.50	2.87	MB3015USB-4
1	06.0 x 2.7	-47 ±3	100 - 10K	2.0	10	0.500	>50dB	10pF, 33pF	423-1094-ND	2.95	2.00	1.57	MB6027USC-3
2	09.7 x 5.0	-47 ±3	100 - 10K	1.5	10	0.500	>55dB	33pF	423-1096-ND	3.57	2.38	1.94	MB9750USB-4
8	09.7 x 5.5	-44 ±2	100 - 10K	1.5	10	0.500	>55dB	None	423-1025-ND	2.31	2.15	1.94	MD9755USZ-1
9	06.0 x 5.2	-44 ±3	100 - 10K	2.0	10	0.500	>60dB	None	423-1078-ND	1.68	1.52	1.22	MB6052USZ-2

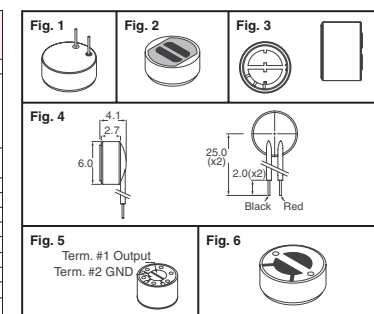
◆ RoHS Compliant



CUI INC NEW! Electret Condenser Microphones



Fig.	Physical Size (mm)	Sensitivity (dB)	Standard Operating Voltage	Built-In Capacitor	S/N Ratio (dB)	Max. Current Consumption (mA)	Digi-Key Part No.	Price Each	10	100	CUI Inc. Part No.
Omnidirectional											
1	09.7 x 6.5	-42	4.5	—	60	0.5	102-1720-ND	.81	.70	.54	CMA-6542PF
	09.7 x 4.5	-44	3	—	60	0.5	102-1721-ND	.66	.57	.44	CMA-4544PF-W
	09.4 x 5.5	-44	4.5	—	60	0.5	102-1722-ND	.72	.63	.48	CMR-6544PF
	06.0 x 5.0	-42	2	—	56	0.5	102-1724-ND	.96	.83	.64	CMC-5042PF-AC
	06.0 x 5.0	-44	2	—	56	0.5	102-1725-ND	.96	.83	.64	CMC-5044PF-A
	06.0 x 2.7	-42	2	33pF	58	0.4	102-1726-ND	1.71	1.48	1.14	CMC-2742PBJ-A
2	06.0 x 2.2	-42	2	33pF, 10pF	58	0.5	102-1727-ND	1.77	1.53	1.18	CMC-2242PBL-A
3	06.0 x 5.0	-44	2	—	60	0.5	102-1723-ND	.90	.78	.60	CMC-5044TF-A
3	09.7 x 6.5	-42	1.5	—	58	0.5	102-1719-ND	.66	.57	.44	CMA-6542TF-K
4	—	-42	2	33pF, 10pF	57	0.5	102-1732-ND	2.10	1.83	1.40	CMC-2742WBL-25L
Noise-Cancelling											
1	06.0 x 2.7	-47	2	—	56	0.5	102-1731-ND	2.22	1.93	1.48	CMR-2747PB-A
5	09.7 x 5.2	-47	1.5	—	58	0.5	102-1729-ND	2.46	2.14	1.64	CMR-5247TF-K
6	06.0 x 5.0	-54	2	—	56	0.5	102-1730-ND	2.34	2.03	1.56	CMR-5054TB-A
Uni-Directional											
5	09.7 x 5.2	-47	1.5	—	60	0.5	102-1728-ND	1.77	1.53	1.18	CMI-5247TF-K



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High Performance Audio Products

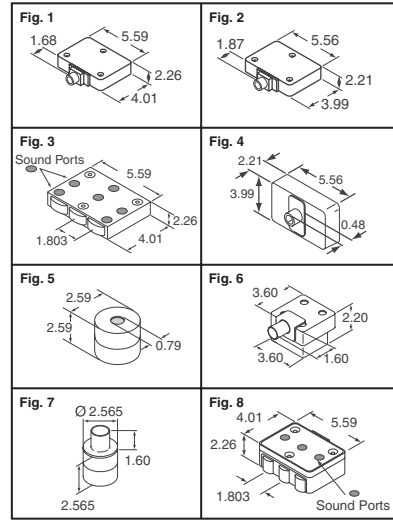
Omni-Directional Electret Microphones

Dim. in mm

FG Series: • Integral FET amplifier • Wide, flat frequency response • Low noise performance • High electroacoustical sensitivity • 3-Wire configuration
EM Series: • Integral FET amplifier • High electroacoustical sensitivity • Low vibration sensitivity • Low Noise • Small size **WP Series:** • Integral FET amplifier • High electroacoustical sensitivity • Low noise • Low vibration sensitivity • Flat response down to very low frequency • Survives submersion in water • 3-Wire configuration **EK Series:** • Integral FET amplifier • High electroacoustical sensitivity • Low vibration sensitivity • Low noise • 3-Wire configuration **EA Series:** • High resistance to mechanical shock • Rugged construction to withstand severe environmental conditions

Fig.	Sensitivity @ 1kHz		DC Supply Voltage	Max. Amplifier Current Drain (µA)	Max. "A" Weighted Noise (1kHz Equivalent SPL)	Output Imped. (Ω)	Digi-Key Part No.	Price Each			Knowles Acoustics Part No.
	(dB re 1V/Pa)	(dB re 1V/0.1 Pa)						1	10	100	
1	—	-53 ±2	1.3 - 10	50	26.0 dB	4400	423-1098-ND	28.75	23.43	20.13	EK-23024-P07
	—	-59 ±3	1.3 - 10	50	28.5 dB	3500	423-1124-ND	19.01	14.94	12.90	EA-21842-C36
	—	-53 ±2	1.3 - 10	50	26.0 dB	4400	423-1121-ND	19.80	15.56	13.44	EK-23024-C36
2	—	-53 ±2	1.3 - 10	50	26.0 dB	4400	423-1099-ND	20.57	16.77	14.40	EK-23133-C36
3	-33 ±3	-53 ±3	1.0 - 10	50	26.0 dB	4400	423-1008-ND	24.54	22.12	15.80	EK-3132
4	—	-53 ±2	1.3 - 10	50	26.0 dB	4400	423-1120-ND	19.80	15.56	13.44	EK-23027-C36
5	-33 ±3	—	0.9 - 1.6	50	28.0 dB	4400	423-1064-ND	40.10	36.13	25.81	FG-3629-P16
	—	-53 ±3	1.3 - 1.6	50	30.0 dB	4400	423-1119-ND	26.60	21.68	18.62	FG-23329-C05
	-43 ±3	—	0.9 - 1.6	50	30.0 dB	4400	423-1068-ND	29.97	27.01	21.29	FG-3742-D36
	—	-53 ±3	1.3 - 1.6	50	28.0 dB	4400	423-1123-ND	26.60	21.68	18.62	FG-23629-C36
6	-36 ±3	—	0.9 - 1.0	50	31.0 dB	4400	423-1061-ND	23.64	21.30	16.90	EM-3046
	-36 ±3	—	0.9 - 1.0	50	31.0 dB	4400	423-1062-ND	31.18	28.09	22.15	EM-3046-P16
	—	-56 ±3	1.3 - 10	50	31.0 dB	4400	423-1122-ND	23.44	19.11	16.42	EM-23046-C36
7	-33 ±3	—	0.9 - 1.6	50	28.0 dB	4400	423-1065-ND	29.65	26.71	21.05	FG-3652-C36
	-33 ±3	—	0.9 - 1.6	50	28.0 dB	4400	423-1066-ND	40.10	36.13	25.81	FG-3652-P16
Waterproof Microphones											
8	-34 ±3	-54 ±3	1.0 - 10	50	28.0 dB	4400	423-1012-ND	33.39	30.09	21.49	WP-3502
	-34 ±3	-54 ±3	1.0 - 10	50	28.0 dB	4400	423-1054-ND	37.22	33.53	23.95	WP-3502-P16

◆ RoHS Compliant • Has 1 inch long leads † Has 79 inch long leads

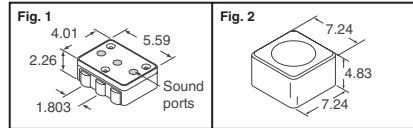


Noise-Canceling Close Talking Microphones

Dim. in mm

NR Series: • Integral FET amplifier • Diaphragm responds to pressure differential giving high rejection of background noise • Small size • High electroacoustical sensitivity • Low vibration sensitivity
CF Series: • Integral FET amplifier • Diaphragm responds to pressure differential giving high rejection of background noise • Withstands severe environmental conditions • Sound ports protected by woven mesh treated with water repellent • High resistance to mechanical shock
WP Series: • Integral FET amplifier • Survives submersion in 1m water • Corrosion resistant • Withstands explosive decompression • High resistance to mechanical shock • Small size

Fig.	Sensitivity @ 1kHz		Microphone Configuration	DC Supply (V)	Max. Amplifier Current Drain (µA)	Nominal Output Imp. (Ω)	Digi-Key Part No.	Price Each			Knowles Acoustics Part No.
	(dB re 1V/Pa)	(dB re 1V/0.1 Pa)						1	10	100	
1	-32 ±3	-52 ±3	2-Wire	1.0 - 10	200	2500	423-1010-ND	16.90	15.23	11.04	NR-3160
2	-42 ±3	-62 ±3	3-Wire	1.0 - 10	50	3500	423-1014-ND	25.16	23.91	22.65	CF-2949
Waterproof Microphone											
1	-34 ±3	-54 ±3	2-Wire	1.0 - 10	300	2500	423-1011-ND	28.14	25.35	18.11	WP-3501



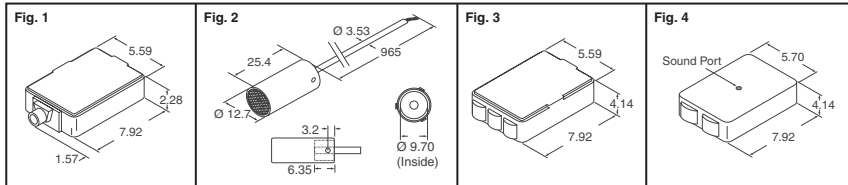
Piezo Ceramic, Accelerometer, Magnetic Balanced Armature

Dim. in mm

BL Series: • High sensitivity • Wide frequency range and flat response • Integral FET amplifier • High resistance to mechanical shock • BL-1785 typically used for instrumentation applications • 3-Wire configuration
BU Series: • Ceramic vibration transducer • High vibration sensitivity and small size • Wide frequency range • Integral FET preamplifier • 2 or 3-Wire configuration
BJ Series: • Balanced armature technology • High efficiency, stability and reliability • Self-shielded against external magnetic fields • Small size • Omni-directional • 2-Wire configuration

Fig.	Sensitivity @ 1kHz			DC Supply Voltage	Nominal DC Res. (Ω)	Max. Amplifier Current Drain (µA)	Max. "A" Weighted Noise (1kHz Equivalent SPL)	Output Imp. @ 1kHz (Ω)	Digi-Key Part No.	Price Each			Knowles Acoustics Part No.
	(dB re 1V/Pa)	(dB re 1V/0.1 Pa)	(dB re 1V/g)							1	10	100	
Piezo Ceramic Microphones													
1	-49 ±3	-69 ±3	—	3.0	—	160	34.0dB	4000	423-1003-ND	102.18	92.06	65.76	BL-21785
2	-49 ±3	-69 ±3	—	3.0	—	160	34.0dB	4000	423-1002-ND	126.99	114.07	90.57	BL-21994
3	—	-54.5 ±3	—	1.3	—	50	34.0dB	13000	423-1097-ND	46.78	38.69	34.14	BL21671-140
Accelerometer (Vibration-Sensing Transducer)													
3	—	—	-45.0 ±4.5	1.5 - 10	—	50	—	5200	423-1004-ND	52.71	47.49	33.92	BU-21771
Magnetic Balanced Armature													
4	-55.5 ±3	-75.5 ±3	—	—	900	—	—	3900	423-1001-ND	36.03	32.46	23.19	BJ-21590

◆ RoHS Compliant



Waterproof Acoustical Transducers

Dim. in mm

MR Series: • Highly waterproof, no loss of performance after immersion in 15m water • Corrosion resistant • Withstands explosive decompression • Excellent environmental performance • High resistance to mechanical shock • Wire leads attached

Fig.	Sensitivity @ 1kHz		DC Supply Voltage	Max. Amplifier Current Drain (µA)	DCR @ 20 dC ±10% (Ω)	Max. "A" Weighted Noise (1kHz Equivalent SPL)	Load Condition (Ω)	Output Imp. @ 1kHz (Ω)	Digi-Key Part No.	Price Each			Knowles Acoustics Part No.
	(dB re 1V/Pa)	(dB re 1V/0.1 Pa)								1	10	100	
Electret Microphone													
1	-41 ±4	-61 ±4	1.0 - 20	50	—	30	10K	3.5K	423-1016-ND	37.73	34.00	27.50	MR-8406
Magnetic Microphone													
2	-67.5 ±3	-87.5 ±3	—	—	75.5	—	300	300	423-1015-ND	23.12	20.84	19.96	MR-3151

(Continued)

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